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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLVII
No. 1216

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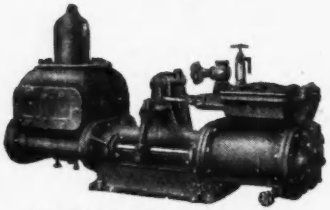

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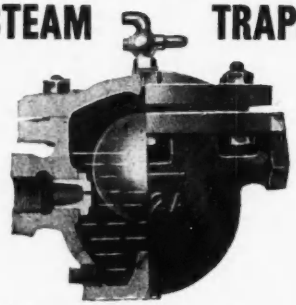

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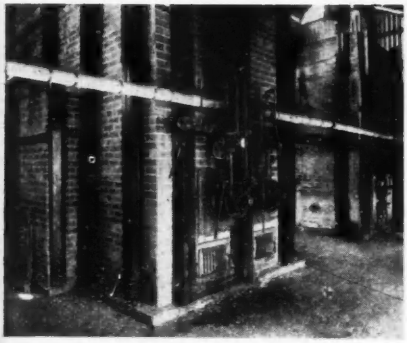

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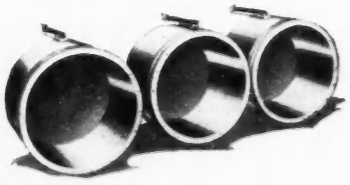

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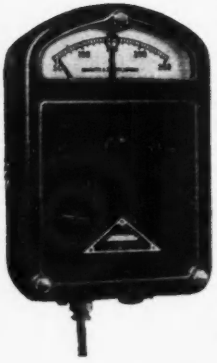

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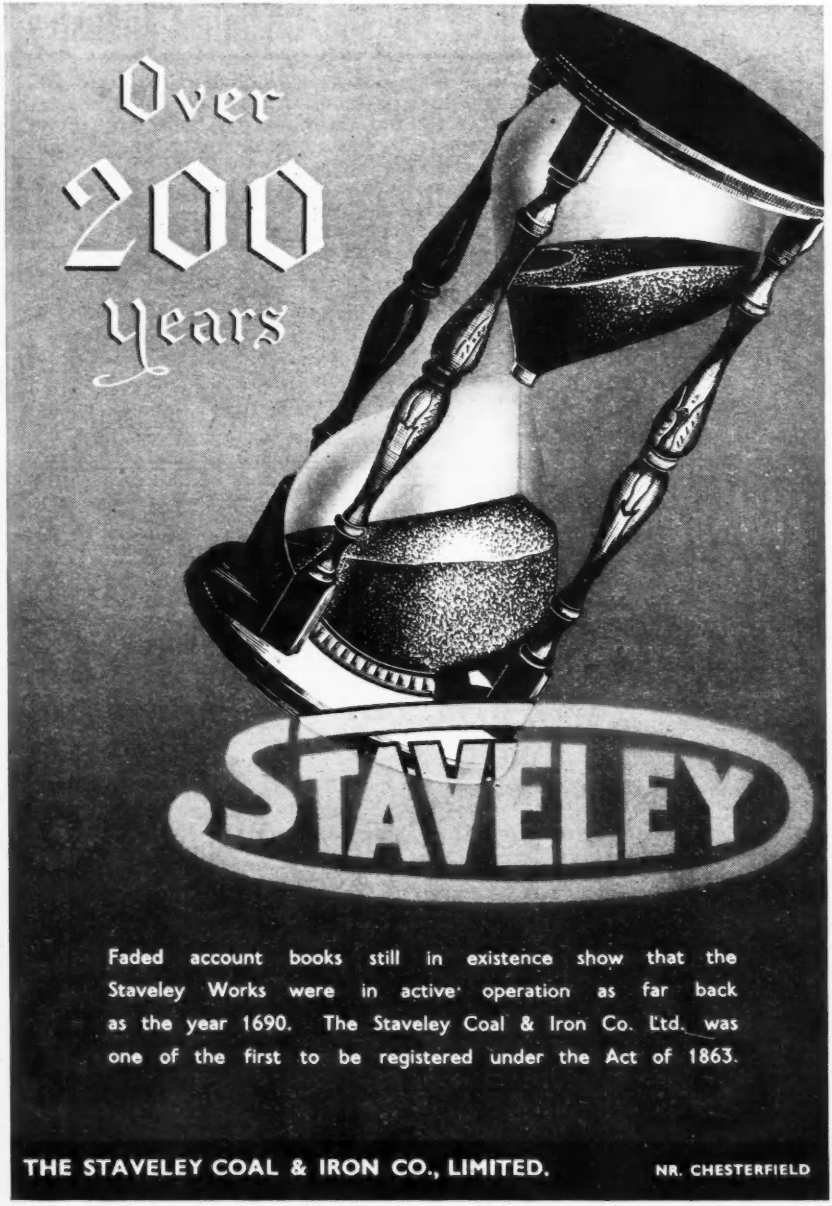

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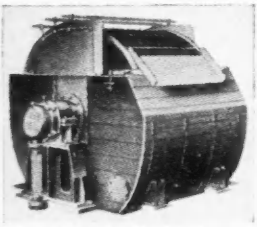

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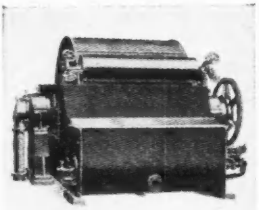

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Physical Methods of Analysis

WE have always held that though the proper study of mankind may be man, as Pope declares, the proper study of the chemist is physics. It is a nice point whether the industrial chemist should ever take an honours degree if he thereby debars himself from the study of physics and mathematics. So much of what is taught in the honours course is highfalutin' stuff that is not likely to be of any practical use and of the truth of which no one is yet quite certain, that we should be disposed to forgo it all, to read it at our leisure in an arm-chair in the winter evenings, if thereby we could at our University be trained in physics and mathematics at least up to "pass" standard. That, however, is a digression, and is probably heresy. The fact remains that physics plays quite as large a part in industry as does chemistry.

These reflections have been prompted by certain announcements in the technical Press of newer applications of physical methods to analytical processes. The study of the structure of solids by their X-ray diffraction spectra is now well established It was an abstract research method for investigating the structure of crystals a generation ago; today it is an analytical method that is being increasingly used. Some striking examples of how the technique is applied were given at the recent X-ray conference of the Institute of Physics at Cambridge. These methods dealt with industrial problems connected with refractories, ferrous and non-ferrous metals, and organic and inorganic chemicals. The identification of an X-ray pattern is not an easy matter, but it becomes easier when there are comparison patterns available. This technique is facilitated if a large number of standard comparison spectra for many different substances are available.

The American Society for Testing Materials has prepared a card index of diffraction data for some 1200 substances, in a form suitable for chemical analysis by this method. The cards are reproduced by a photographic process giving the spacings of Angström units of the three strongest lines and their approximate intensity ratios, the name and formula of the substance, and details of the powder pattern. Other relevant data are given when known. When a substance is to be identified by this method, a powder-photograph is taken, and the spacings of the three strongest lines measured. The name of the substance

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may then be found from the appropriate card in the index. It is proposed by the Institute of Physics either to obtain a number of these indexes for use in this country and to supplement them with cards covering 300-500 other substances for which information is available, or to prepare a British index on similar lines. There are comparatively few highly qualified X-ray spectroscopists in this country. If our memory is correct, the number was put at half a dozen at a meeting of the Society of Chemical Industry some three years since. Nevertheless the importance of the technique is growing, and it will evidently become regular industrial practice before long.

The use of induced radioactivity as a method of tracing the distribution of small amounts of chemical elements in larger masses was described to the London section of the Society of Chemical Industry a few years ago. The passage of trace elements through the human body, for example, can be followed in this way, and there are many other applications which were described in a leading article in this paper at the time. An application of this method to industrial purposes has lately been described in the American paper *Research Progress*. It has long been known that phosphorus is an embrittling agent in steel, and coke low in phosphorus is especially prized in the iron and steel industry. That was the reason why Cumberland iron was so highly valued at one time. Dr. W. E. Shoupp, research physicist to the Westinghouse company, has lately used the radioactivity method for determining the distribution of phosphorus in steels. The phosphorus is treated to stimulate artificial radioactivity in it, and can thus be detected *in situ* in the steel, after being induced in the ordinary process by manufacture, through its radioactive emanations. Phosphorus was found to be concentrated within minute pockets or air-holes in the steel. Just why this should make the steel brittle when cold is not revealed; but presumably the detection of the mode of occurrence of the phosphorus must be the first step in that direction. The relative volatility of phosphorus makes it somewhat surprising that this element should be retained by molten steel, unless it is combined with the steel in the form of an alloy of some stability. Shoupp's observation seems to rule this out.

The same method can be used to show the distribution of sulphur, manganese, silicon, and any other constituent of the steel that can be made radioactive. This must presumably be a research method only, for the elements can hardly be selectively activated *in situ*. A similar method is being used in the same laboratories to follow the diffusion of one metal into another to form an alloy. Theoretical evidence has suggested that this is caused by molecular motion; this idea may be substantiated, but results have not yet been published. In the medical sphere, some experiments on bone formation are recorded. The material of which bones are composed is being continually renewed with the body. Vitamin D has been found to act partly by favouring absorption of calcium from digestive tracts, and partly by a direct effect on the mineralisation of bones. The most active part of the tissue biologically is most active in retention of the radioactive replacement materials.

NOTES AND COMMENTS

The Mass Spectroscope

AN interesting development in the progress of physico-chemical research is the use of the mass spectrometer. This is a method used for research upon stable, non-radioactive isotopes—an important and often difficult matter. Deuterium can be investigated by change of density, but for other elements the mass spectroscope is virtually the only method. It is announced, also in America, that a mass spectroscope is now marketed suitable for routine use. This is another method of studying traces of elements, but it is now finding applications in other fields as well. It is said to be particularly valuable for gas analysis. Furnace atmospheres and other reaction mixtures have been studied by this instrument, which can show the presence of a gaseous constituent in extremely low concentration by the formation and detection of ions of characteristic mass. The use of physical instruments formerly of research value only bids fair to become a commonplace of industry.

Non-Ferrous Scrap

WE have become so accustomed, in our daily life, to regard such things as old door-knobs, battered tin soldiers, and the like, as absolutely worthless, that the Ministry of Supply's latest appeal for the collection of scrap came almost as a surprise. Actually, of course, the importance of non-ferrous metals to the war effort is obvious if the slightest thought is given to the matter; yet it remains surprising that there should really be a copper shortage in the United Nations' stock-pile, though at the same time this very shortage is a tribute to the tremendous activity that is using up this stock-pile as fast as, or faster than, it is built up. That there is a shortage is evident, however, from the fact that copper has been placed on the United States list of "critical" materials. Supplies for civilian purposes have been suspended in the U.S., and gold miners are in course of being transferred from the gold mines to the copper mines in order that the flow of production may not halt for a moment. South America, notably Chile, is benefiting by high-priced contracts, and new mining developments are being fostered by technical and financial aid. It is the present duty of the metallurgical chemist to give his mind to the problem of new uses for this copper (and for other non-ferrous metals), which will suddenly become available after the war in immense quantities. Just because a material is cheap and plentiful it must not be allowed to go to waste, as many materials did under the pre-war economic system.

Low-Temperature Carbonisation

IT would be foolish to say that Germany was short of oil in the sense that the lack of it was holding up her military operations. But the provision of new supplies to take the place of used-up reserves is a leading factor in the formulation of her war plans. Production at home by the expensive artificial processes known to us has been developed to a greater extent than anywhere else. With the recession of the promised Caucasian prize as a result of the heroic resistence of the Russians, the Nazis' need for increased home production is even greater than before. Developments which are being watched with interest by us are moving in Germany as a result. The encouragement of low-temperature carbonisation is taking place because of the larger output of fuels compared with high-temperature carbonisation. As this newer method of treating coal results in the retention by the hard fuel of valuable by-products, it is to be presumed that the Germans consider the loss worth while in view of the prime necessity for liquid fuel.

By-Products take First Place

ON the other side of the picture new outlets have to be developed for low-temperature carbonisation coke and gas. These are used for the production of energy and experiments are taking place to find a more general low-temperature application to coal and lignite before they are burned in power stations. Increased use in gasworks has been hindered by the fact that the optimum capacity of a low-temperature carbonisation plant is at least 1000 to 2000 tons of coal a day. The smaller gasworks cannot, therefore, make advantageous use of it unless they are grouped together in larger regional units. Controversy in this country has long centred on the question of the extent to which coal should be relieved of its by-products before being used as hard fuel. The *Gas World* pointed out recently that, at its inception, the prime purpose of low-temperature carbonisation in this country was to produce the hard fuel, just as the production of gas from coal was the beginning of the gas industry, the production of by-products being subsidiary. Germany is now ordering this side of her war industry on the premise that the by-product is the chief consideration. The move has a significance which makes it of interest to many industrialists over here.

Talking-Film Lecture

THE Melchett Medal for 1942 was presented last Tuesday to Dr. Arno Carl Fieldner, chief of the Fuels and Explosives Services, U.S. Bureau of Mines, at the Institution of Electrical Engineers. It was received on his behalf by Mr. Mulford Colebrook of the U.S. Embassy in London. The Melchett Lecture (The Analysis and Testing of Coal in Relation to its Properties and Utilisation), prepared by Dr. Fieldner, was delivered at the opening meeting of the

Institute of Fuel by means of a talking film which showed the lecturer in action. In this way not only the lecture but the lecturer also was presented to the audience in a way which ensured the greatest interest from those present.

Chrome Bargains

IF Papen were anything but a German, one could feel almost sorry for him, considering the way he has to hurry from Berlin to Ankara and from Ankara to Berlin, trying to negotiate a bargain on behalf of his masters for the supply of the precious Turkish chrome ore. He knows full well that his masters have no spare war material with which to implement their part of the bargain with Turkey; and he knows that the Turks know that there is remarkably little likelihood of an honourable execution of the German side of the bargain, even if the spare material were available. This last is evident from the Turkish insistence that the stipulated machinery and munitions must be delivered on Turkish soil before an ounce of chrome goes to Germany. Papen's task is thus an unenviable one in all respects. Meanwhile, negotiations between the Turkish Government and the British and United States Governments for a prolongation of the chrome-supply agreement (which expires early next year) are being carried on in an atmosphere of friendly confidence. Turkish chrome supplies are scantier than they were, owing to plant and other difficulties; but we can make a shrewd guess as to who is likely to get the lion's share of them in 1943.

Dehumidification

IN a recent paper at an American industrial conference the author, Mr. Don D. Beach, discussed drying processes. He pointed out that the field for direct dehumidification was rapidly expanding, partly because of the ground work done prior to the war, but principally because so much of war-time production is dependent on having finely-controlled atmospheric conditions. Many materials, he says, such as foods, chemicals, drugs, leather, and so on, are harmed by excessive heat and they must necessarily be carefully dried at low temperatures by the dehumidification method. Silica gel and activated alumina used in conjunction with gas heat are widely used absorbents. These materials are extremely porous and moisture from the air is attracted to and adheres to the sub-microscopic pores in them. The moisture, says the author, is driven off at the proper time and with suitable equipment. Where a smaller change in relative humidity is required he recommends a liquid type of absorbent agent such as lithium chloride brine or "so-called 'Kathene solution.'"

Liquid-Air Bombs

THERE is more behind the famous R.A.F. euphemism "beautiful bombs" than meets the eye. The description covers a multitude of varieties and is calculated to discourage inquiry into the exact nature of our latest types of bomb. But reports come through of their impressive effect on the enemy and, in time, we hear something of their composition from the same source. A pro-Axis radio station in France has announced that in the recent daylight raid on Lille liquid-air bombs weighing about 2000 lb. were used. If this is true it is the first news of the employment of a bomb of this kind. Tests with liquid oxygen cartridges were conducted early in the war by the United States Bureau of Mines, but the production of this type of explosive dates back much farther. In his book, "Explosives," Dr. John Read states that liquid oxygen explosives were first used on a large scale in the construction of the Simplon Tunnel in 1899.

Wholesale Prices in September

ALTHOUGH the wholesale price index figures for iron and steel and for non-ferrous metals have maintained an unchanging level for yet another month, the figure for chemical prices has once again shared in the prevalent tendency to rise. It now stands at 134.7, according to the Board of Trade list of Index Numbers, as against 134.4 in August (1930=100), representing a rise of 0.3 per cent. The figure in September, 1941, was 128.3 and the rise since then amounts to 5 per cent. The total figure for industrial materials and manufactures is 161.1, a rise of 0.2 per cent. over the August figure of 160.8. The most important changes in the chemicals and oils group occurring in September were a rise of 12 per cent. in the price of household soap, and one of 31 per cent. for palm kernel oil.

Association of British Chemical Manufacturers

War-Time and Post-War Activities

THE 26th annual general meeting of the Association of British Chemical Manufacturers was held in London on October 8, with Mr. C. F. Merriam in the chair. In moving the adoption of the annual report and accounts, the chairman followed the example of his predecessor in referring only briefly to the items recorded there, but stated his intention of saying something about post-war planning.

Mr. C. F. Merriam, chairman of the A.B.C.M. for the coming year.

The Chairman's Speech

"Little change has occurred in the Council," Mr. Merriam continued, "but Mr. C. E. Carey, our honorary treasurer, was elected as a member, and we are glad to welcome Mr. T. D. Morson, who was co-opted in Mr. Carey's place. Sir Christopher Clayton, after many years of active participation in our work, resigned his position as a vice-president on retirement from business, and was elected an honorary vice-president.

"During the year we have changed the procedure for dealing with applications for membership, so that every member of the Association is now given an opportunity of expressing his views and not only the Group which the applicant wishes to join. My own view, which was endorsed by the Council, is that our Association ought to be completely representative of all that is good in the chemical industry, so long as it is British. As the result of the co-operation between our Association, the Association of Chemical Employers, the Chairman of the Chemical Control Board and the Ministry of Labour, the chemical industry now receives treatment in labour matters commensurate with its importance to the war effort.

"Some alarm was caused this year among the fine chemical manufacturers by the Government's suspension of the duties, including the Key Industry Duty, on the imports of certain materials which come in mainly on Government account. The Association was able to obtain a definite assurance from the Treasury that there was no intention of undermining the Key Industry Duty. Speaking of the great services of Dr. Armstrong, the chairman reminded his audience that the industry owed him a deep debt of gratitude for the way in which he nursed the newly constituted Chemical Division of the British Standards Institution and so established it firmly as an integral part of industrial standardisation.

Post-War Planning

On the question of post-war planning, Mr. Merriam recalled Mr. Duncalfe's thought-provoking views on the post-war organisation of trade associations in general and of the A.B.C.M. in particular.

"The Council," he continued, "have had the question under review recently, and I suggest that it may be necessary to go even further than to examine only the organisation of our Association and its relation to other bodies. I think we may need at the same time to consider the whole structure of the chemical industry and determine if it is organised to operate on a basis which will give, after the war, the most efficient service to the community at home and a satisfactory contribution to the export trade of the country. Such a survey would include an examination of their position by individual manufacturers and sections of the trade making the same products. A start on these lines has been made in at least one quarter, and I submit that the Association would be doing no more than its duty in giving encouragement and help to such a study.

"So far as the organisation of the Association itself is concerned, this fundamental question may involve such mat-

ters as whether the scope of our membership is sufficiently clearly defined or whether there is overlapping with other associations; whether it is desirable for membership of a trade association, such as the A.B.C.M., to be compulsory for all firms in the industry; whether such an Association should be in a position to enforce its decisions; whether it should exercise control over production and prices and also extend its activities to include relations with labour. These are some of the points on which we intend to seek the views of our members and we are now engaged in preparing a letter of inquiry for this purpose. After the replies have been collated and considered, we may be in a position to frame a post-war policy, though it is no light task and will take a considerable time."

Points from the Report

The Association has continued to work in the closest contact with the Government departments concerned with chemical products, and the technical knowledge and experience of the Association has been called upon extensively in connection with control and rationing schemes for chemicals.

The Association co-operated with the Association of Chemical Employers, the Unions, and the Chemical Control Board in the issue of a memorandum of guidance on the employment of women, together with a detailed list of jobs women were doing in the chemical industry. In December, 1941, the chemical industry was scheduled as a vital munitions industry and special arrangements were made to deal with the machinery of reservation and deferment under the Chemical Industry Labour Supply Scheme. This resulted in treatment commensurate with the importance of chemical manufacture to war production. A memorandum of guidance on the part-time employment of women is in preparation.

Avoiding Duplication

The Council has condemned unnecessary duplication of production, especially under war conditions, and by encouraging members to keep the Association informed of their development plans, has sought to avoid such a position.

The fine chemical industry has been able to supply the needs of the country to such an extent that very few products indeed have been referred to the scheme for the production of fine chemicals in University Laboratories on the grounds that they were essential and yet not made here. The organisation of the production and disposal of tar distillation products to serve the maximum national advantage has been further developed during the year by the Coal Tar Control in co-operation with the distillers.

The period under review saw a continual extension of the range of products subject to the export licensing system (import control on chemicals had already become all but complete), while overseas countries for one reason or another introduced extensive import restrictions, with the result that chemical export activity became very considerably circumscribed.

The factory department has resumed consideration of a number of matters which had to be deferred owing to the war. Draft regulations issued under Section 15 of the Factories Act, 1937, added certain chemical processes, put forward by the Association, to the list of continuous processes which are already exempted from certain restrictions on approach to unfenced machinery and machinery in motion. The question of exempting buried storage tanks containing tar distillation products and operated by air pressure, from some of the requirements of Section 31 is one of the matters which is also being revived by the department. A system of awards of supplementary clothing coupons for workers in the heavy chemical and dyestuffs sections of the chemical industry was also worked out, as well as a schedule of supplementary awards for fine chemicals, disinfectants and insecticides, and pigment colours.

Income Tax Allowances

The question of increased income tax allowances for chemical plant which is subject to abnormal wear and tear because of war conditions, accelerated production, continuous working and reduced maintenance was examined. An increase in the present flat rate allowance was found not to be practicable because of individual variations, but members were advised of suitable methods of approach to local tax inspectors, who have considerable discretion in such matters.

The Traffic Committee has accepted

various adjustments of compensation payable by the Government for the use of requisitioned railway wagons, cost of repair, damage, etc., and members interested have been notified. The proposal that all goods consignments be "carriage paid" has still not been adopted, and no order has yet been made The Association was consulted and submitted suggestions in connection with proposed restrictions on the stowage of chemicals when conveyed in the same ship as Government explosives or ammunition.

Council for the Year

The constitution of the Council for the ensuing year will be as follows:—

President: Mr. R. Duncalfe. *Vice-presidents*: Dr. E. F. Armstrong, F.R.S.; Dr. F. H. Carr, C.B.E., F.I.C.; Mr. E. V. Evans, O.B.E., F.I.C.; Mr. C. A. Hill, B.Sc., F.I.C.; Sir David Milne-Watson, Bt., D.L., LL.D.; Mr. R. G. Perry, C.B.E.; Mr. E. Wallace, C.B.E. *Hon. vice-presidents*: Sir Christopher Clayton, Sir Martin O. Forster, F.R.S., Mr. N. N. Holden, Lord McGowan, K.B.E. *Elected members*: *Chairman*: Mr. C. F. Merriam. *Vice-chairman*: Dr. P. C. C. Isherwood. *Hon. treasurer*: Mr. C. E. Carey. *Members*: Messrs. F. W. Bain, M.C., T. R. G. Bennett, A. E. Everest, G. E. Howard, H. Jephcott, W. F. Lutyens, L. P. O'Brien, J. H. Olliver, D. J. W. Orr, A. E. Peak, F. M. Roberts, K. H. Wilson, W. J. U. Woolcock. *Co-opted members*: Mr. A. D. Daysh, Mr. C. G. Hayman, Mr. T. D. Morson, and Lord Trent.

Trade Notes

Metal Jointing — Filter Makers Come of Age

A JOINTING cement which is used for metal-on-metal connection in chemical plants is produced by CLOUGH (CROYDON), LTD., who give THE CHEMICAL AGE the following details of their material. It is called "Suprete" and was invented in powder form in 1903. It is not, it is claimed, disintegrated by condensation or vibration and has great tenacity and strength although all joints can be easily broken and cleaned even after long use under high pressures and temperatures. This material is free from gritty matter and does not injure the most delicate plant. Its other qualities, according to the makers, are that it is rustless and imperishable and does not depreciate in stock in any climate. The makers guarantee "Suprete" to seal securely all flange joints used in connection with high pressure, superheated and saturated steam, water gas, petrol, benzol, toluene, solvents, acids, caustic liquors and vapours, oils, ammoniacal and alkaline liquors. It is designed for all chemical, gas, and recovery plants. For some years this material has been manufactured in sheet form having a tensile strength of 4000 lb. per sq. in. This is homogeneous with the jointing cement, and is compounded to resist the penetrative nature of liquids, gases, etc. Instructions given for the preparation and application of "Suprete" are: Mix a quantity of the powder with boiled linseed oil to the consistency of stiff putty. Apply a thin layer to one flange. Bring the flanges together and bolt up evenly and securely.

The VISCO ENGINEERING COMPANY has published an illustrated leaflet to celebrate its coming of age, in which a number of interesting advances made by the company during the past 21 years are recorded. The Visco Air Filter, the first all-metal air filter using oil-film-covered surfaces, originally made by outside contractors, was first manufactured by the company in 1924. In the same year, the first Visco water-cooling towers began to appear at power stations and industrial establishments. A ventilating department was opened in 1927 and the dust-collecting department in 1928, the latter dealing particularly with the Visco-Beth automatic plant. In the summer of 1932 the growing business was moved to Croydon.

The introduction of the Visco rotating self-cleaning filter marked the year 1932; the new filter was designed for heavy duties and for long periods of operation without attention. To meet the demand for a filter of the "dry" type, the Visco patent "C.E." filter with dry "throw-away" pads as a filtering medium was designed. Meanwhile, the water-cooling side of the firm has not been neglected. The Visco "Steelshell Forcedraft" Cooling Unit (1937) is designed for small and medium water capacities and indoor as well as outdoor use. The Visco patent "Sprayblast" Oil Cooler (1939) has also proved successful. In 1937, the company acquired an established concern manufacturing ozone-generating apparatus. Today practically the whole of the company's output is being used in the war effort.

Portable Mixing Plant

Economy in Power and in Floor Space

WHERE the mixing of chemical products is carried out intermittently or on a comparatively small scale, the portable mixer has many advantages to offer. These units, which are self-contained, consist of a motor to which is geared a propeller shaft, though direct drive is also used, the mixer being clamped to the side of a vessel and plugged into the electric supply. The machines are portable and compact, and require little floor space, while they may be changed from tank to tank quickly and easily. In some cases one mixer can be used for agitating the contents of several tanks, or it may be employed for speeding up the mixing in old-fashioned mixers. With such apparatus installation expense is eliminated, while overhead shafting, belting, gears, and moving parts not actually engaged in productive work are unnecessary.

Propeller Types

The types of propeller used vary and may be single-screw or double-screw. In one interesting design two propellers are used, one at the end of the shaft and the other about half-way down. It was shown that where one propeller at the base of the shaft was supplemented by a second, of opposite pitch, adjustable to varying distances from the first, the increase in speed and mixing efficiency was more than doubled, provided that the motor power was sufficient to turn the blades as rapidly. It was also discovered that by giving the top propeller an extra pitch, it would carry the weight of the shaft, propellers, and motor armature, thus relieving the motor strain. It is thus claimed that all the power supplied by the motor is used for mixing.

In the usual mixing process, where solids are to be mixed with liquids, the solids are precipitated at the bottom of the tank, the turbulence of the mix causing a gradual absorption into solution of these solids. With the object of preventing this precipitation, the mixing action of the lower propeller is often reversed, giving an upward pull. The upper propeller forces the liquid down and the action of the opposed blades sets up a vortex. In some instances special processes require a type of mix which is not absolutely thorough. For such a purpose the single propeller of the screw type is advised, as it creates a mild stirring motion suitable either for continuous agitation of readily soluble materials, or for maintaining baths at even temperatures.

Solid shafts of acid-resisting alloy carefully designed to prevent whip and vibration, with the consequent wear on the motor bearings, are used to-day, and are to be preferred to the telescopic type of adjustable shaft. The top section of the telescopic shaft is hollow and tends to collect liquid and foreign matter inside, often causing contamination. The bottom section often has a tendency to slip, thus reducing mixing action, while it has been known to detach itself completely and cause considerable damage. The solid shaft is stronger, runs truer, and also allows adjustment of both propellers, where two are used, for the full length of the shaft. The motors used for this service vary from the fractional horse-power type up to about 10 h.p. They are vertical and enclosed to prevent the ingress of liquid and fumes, while for some work they must also be explosion-proof. The type of clamp is most important, as this constitutes the foundation of the mixing unit. As a general rule a swivel joint connects the clamp to the motor, permitting adjustment to any angle or position in the tank. It is important that the full weight of the mixer be held directly over the tank wall, so that good support without strain on the tank is ensured, otherwise these mixers cannot be used on light tanks. Large gripping surfaces must be used and anything complicated in the way of clamp design is usually unsatisfactory.

Mixing Heavy Liquids

Many mixing jobs are fixed between certain prescribed limits and, generally speaking, it is possible to employ at the most two types of portable mixer. Most mixes in any one process can be handled by varying the size, pitch, and combinations of the propeller blades, and by using shafts of different lengths. For mixing heavy liquids in tanks up to 50 gallons, medium liquids in tanks up to 200 gallons, or thin liquids up to 1000 gallons, a comparatively slow-speed shaft and large propeller blades can be used, driven by a ⅓ h.p. motor. The shafts can be of Monel metal or aluminium up to about 6 ft. in length, the propellers being some 8 in. in diameter. Generally speaking, for such work the top propeller is fitted with wider blades. This type of mixer is usually gear-driven from the motor.

For mixing syrups, thin varnishes, and liquids of similar consistency in quantities up to 50 gallons, or thin fluids up to 150 gallons or so, a direct-driven mixer is suitable. The propellers may then be about 4 in. in diameter, driven at 1750 r.p.m. by a ¼ h.p. motor. Larger mixers driven by 2 to 10 h.p. motors can be used for tanks

up to 50,000 gallons or on tanks of smaller capacity where extreme agitation of thick liquids is necessary. Mixers with 8 in. propellers driven by a 2 h.p. motor can be employed profitably in tanks of 1000 to 5000 gallons capacity for obtaining very vigorous action. The propeller speed is usually about 1200 r.p.m. Mixers with adjustable speed motors are also obtainable, the available speeds ranging from some 100 to 3000 r.p.m., so that the units can be used for a range of mixing processes. Another apparatus which can be very useful at times is a glass-lined portable mixing tank to which one of these mixing units is permanently attached.

Alcohol Fuel

Shortage in South American Petrol

IN view of the acute fuel shortage, the Argentine Government has issued a decree authorising the Yacimientos Petroliferos Fiscales (State Oilfields) to buy abroad against private tender up to a total of 200,000 tons of oil, including crude, fuel, gas, and diesel oils, kerosene, and lubricating oil. A Bill before Congress also provides for the erection, on the banks of the Paraná and the River Plate, distilleries with a total annual productive capacity of 110,000,000 litres of alcohol, utilising as raw material maize, potatoes and other products. Under this measure the Government would be authorised to expend up to 24,000,000 pesos, such amount to be derived from the surcharge on oil sales. The purpose of the plan is to enable alcohol to be mixed with petrol, the mixture to contain a minimum of 10 per cent. alcohol.

New Brazilian Combustible

The Brazilian Government is also introducing new regulations to facilitate the import and discharge of fuel and lubricating oils. According to official statistics, the consumption in Brazil of fuel and lubricating oils during the first half of 1942 was as follows: petrol 195,786 metric tons; kerosene, 47,030 tons; diesel oil, 65,686 tons; fuel oil, 243,249 tons; lubricating oils, 22,988 tons. The State of São Paulo was by far the largest consumer of these products. It is reported that a new combustible called "potelgas," based on alcohol, is being experimented with as a substitute for petrol in Brazil. Claims are made that this new fuel has greater combustibility than petrol, gives off no smoke, and permits quicker acceleration of vehicles. Furthermore, it is maintained that no costly machinery is required for its manufacture, that it can be produced at a much lower cost than petrol, and that its use has no deleterious effect on automobile engines.

Calcium Hydride

Its Use in the Determination of Water

USE of calcium carbide for determination of water in chemical compounds and mixtures is well known. A. Elitsur (*J. Appl. Chem. Russ.*, 1941, *14*, 682) suggests using calcium hydride for this purpose. A comparison of the equations $CaH_2 + 2\ H_2O = Ca(OH)_2 + 2\ H_2$ and $CaC_2 + 2\ H_2O = Ca(OH)_2 + C_2H_2$ shows that the volume of gas evolved by calcium hydride is twice as large as that evolved by calcium carbide with an equal amount of water. Another advantage of the hydride is the negligible solubility of hydrogen in usual organic solvents which, generally, have a much higher solvent capacity for acetylene. The procedure adopted by Elitsur is as follows: To 3-4 cc. of "absolute" alcohol, 0.1-0.5 g. of CaH_2 powder is added. Since the "absolute" alcohol still contains water, evolution of hydrogen starts at once. When it has ceased, the flask containing alcohol and CaH_2 is connected with a gas burette, and in the flask an exactly weighed amount (0.15-0.25 g.) of the substance to be analysed is introduced. The substance does not need to be soluble in alcohol. The water-free alcohol extracts water also from insoluble substances, and calcium hydride reacts with this water. The volume of hydrogen liberated is measured: each 22.4 cc. (NTP) have been produced by 18 mg. of water. It is advisable to measure the hydrogen volume at frequent intervals and thus to determine the kinetics of the dehydration. If the substance contains water bound in different ways (*e.g.*, hygroscopic moisture and water in a crystal hydrate), the hydration curve shows the amount of each kind of water. Elitsur found, *e.g.*, 7.85% of H_2O in K_2HgCl_4. $2\ H_2O$ (instead of 7.9%), 16.1% of H_2O in $SnCl_2$. $2\ H_2O$ (instead of 15.95%), etc. The only dubious result was obtained with copper vitriol, in which four molecules of water instead of five have been detected.

HATHERNWARE, LTD., Loughborough, have published a new Catalogue Section No. 11, concerning medium and high pressure iron-armoured ejectors. The use of Hathernware High Grade Chemical Stoneware for these instruments adds greatly to their utility in the chemical trade, as it is claimed to be proof against nearly all industrial acids and corrosive liquids.

An interesting point about these ejectors is that they can be used as automatic chemical mixers for inducing a desired amount of liquid (or soluble gas), mixing and delivering the result into a main stream or tank. The catalogue also explains what information should be supplied when inquiring for ejectors or other types of jet instrument.

New Chemistry Course

Widnes Advance Aided by Industry

WIDNES Municipal Technical College draws its students from a wide area on both sides of the Mersey—from Widnes, Runcorn and the Cheshire district towards Chester as well as Warrington—since the chemical industry is located on both banks of the river. In the middle of last session Dr. J. T. Owen was appointed Head of the Chemistry Department and in July last the College was recognised by the Institute of Chemistry for the training of students for the A.I.C. examination. Already 18 students have enrolled for this course during the past fortnight, probably a record figure for a technical college of its size.

The A.I.C. course is supervised by the head of the chemistry department, who has specialised in organic chemistry. Dr. J. T. Owen was previously a lecturer at the Technical College, Dudley. He was trained at the University College, Bangor, under Professor Kennedy Orton, F.R.S., and graduated B.Sc. with first class honours in chemistry and subsequently researched on the terpenes under Professor Simonsen, F.R.S., and was awarded the Ph.D. degree. He also holds the Diploma in Education (with first class). He has held appointments as research chemist with I.C.I., as a chemistry master in a secondary school, and as a lecturer in chemistry in a training college.

Part-Time Lecturers

The other lecturers in the course are part-time instructors. Dr. W. Cule Davies, who is the chief chemist with Peter Spence, Ltd., was trained under Professor Jones at Cardiff, where he graduated B.Sc. with first class honours and was awarded the degrees of Ph.D. and D.Sc. In 1929-38 he was lecturer in physical chemistry at Cardiff; he was then elected to a Leverhulme Research Fellowship and proceeded to carry out further research under Sir William Pope at Cambridge, for which investigations he gained the Cambridge Ph.D. degree. Mr. F. E. Rymill is assistant chief chemist with Evans, Lescher and Webb and graduated B.Sc. with Honours at the Sir John Cass Technical College. He has lectured at the Widnes Technical College for about eight years. Mr. A. V. Harrison graduated at Bristol with honours in chemistry and has been awarded the degrees of M.A. (Bristol) and M.Sc. (Liverpool) for theses on educational subjects. He is now a chemist at a Ministry of Supply factory and was formerly a lecturer in chemistry at the Technical College, St. Helens.

Italian Esparto Wax

Results of Solvent Extraction

ACCORDING to a recent estimate, the esparto paper industry, based on the Cloro Soda Works at Naples, is able to produce about 500 tons of pure by-product wax per annum. In addition, the residue from purification of the wax is said to form an excellent filler for moulded plastics.

Esparto grass for processing at the Naples works is (or was) shipped from Libya in bales from which the crude wax in the form of powder is separated in the earlier stages of the paper-making operations. Some experiments on the solvent extraction of wax from the powder are described by C. Lüdecke in *Fette und Seifen* (1941, p. 452), who, incidentally, points out that in the past the powder has been despatched to a German refining plant and the final product marketed in Germany as "hard vegetable wax."

Solvents tried out were light benzine, commercial benzol, trichlorethylene, 95 per cent. alcohol, alcohol-acetone (1 : 1), methanol-benzol (1 : 1), and amyl alcohol-acetone-benzol (equal parts). Although little difference in physical constants and yield of wax resulted from varying the solvent, the colour was profoundly affected. Wax extracted with benzine was very pale in colour owing to the absence of bitumens, whereas that resulting from treatment with benzol or trichlorethylene was very dark. Extraction with alcohol or alcohol-acetone gives a wax containing 1.2—1.7 per cent. of undesirable pectic substances of dark colour and semi-solid consistency.

CANNING LACQUERS IN GERMANY

The most important condensation lacquers for use in the canning industry are, according to *Kunststoffe*, resins from phenyl aldehyde condensates, especially those soluble in aromatic hydrocarbons, because they form a film of great elasticity and power of adherence. Alkyd phenol resins, modified phenol resins, resins from the condensation products of polyvalent alcohols and polybasic acids, and urea-formaldehyde resins are also being used on a large scale for the protection of food containers. Among polymerisation products coumarone resins are of little importance, but vinyl polymers find large-scale application. Chlorinated polyvinyl chloride yields good films which, however, are somewhat sensitive to temperature. Vinyl ether polymers, acrylic acid ester resins, styrol polymers, and polyamides are also being used. The power of adherence of resin lacquers is improved by a short preparatory treatment of the iron surface with an aqueous phosphate solution.

COLLECTED NOTES ON CHEMICAL SAFETY

Some Reflections on Attaining Greater Safety

by JOHN CREEVEY

PERUSING some collected reports on safety measures in industry recently, it seemed to me that the word "accident" was used far too frequently—possibly for want of another word, and yet sometimes purposely covering an occurrence which was really due to "negligence," "lack of care," or "mind and action disconnected." Mostly, it does seem that "accidents" just happen; investigations may or may not reveal the cause, the contributing factors. Yet would it not be better sometimes to emphasise the truth and show that, perhaps unrealised, dangerous conditions were established step by step, and that the so-called "accident" might have been prevented by greater caution and better knowledge of circumstances?

To the man in the works the word "accident" has a way of blunting any pointer of guilt, and there is some tendency for the "accident" to be accepted as "something which was unavoidable," even with the greatest care. But that is not so, for all—or nearly all—accidents are avoidable. The experience gained as the result of one particular accident can be utilised to prevent a repetition. Likewise, by observing existing conditions and considering all known facts, it is possible to frame a code of safe practice which avoids accidents at their very beginning.

The Value of Explanation

The manner in which diverse circumstances have contributed to an accident needs to be driven home in the mind of all who are likely to have been concerned as the living element in the occurrence; any one of them might have suffered as a casualty. If only one of the contributing factors had been non-existent, the "accident" might never have happened; that one contributing factor was possibly lack of care or imperfect knowledge on the part of one person; that one person may have been any one from among the whole works personnel. It so happened that one particular person failed, possibly in some small detail of attention, and that same person, or another, or many, suffered.

Few of us are immune from making a slip, or momentarily exercising just too little care; speed of working, distracted attention, and other human elements upset the balance of things, and something is then forgotten, or omitted, or just allowed to pass unattended. Ofttimes we are conscious that we are a little too neglectful, or a trifle too speedy, or a little too unconcerned in having inadequate knowledge; too frequently there is no serious attempt to remedy this state of affairs—until the "accident" happens—and, reflecting, we are then able to see the individual part we played in building up the contributory factors. A man slips from a ladder because his foot misses or fails to hold one of the rungs, but more truthfully it is that the foot misses the rung because the man's attention has been distracted or because there was a little too much speed, and mind and action were not in harmony.

Safety in Knowledge

Quoting the words of one of our English poets, we often maintain that "a little learning is a dangerous thing." But in matters of safety, it is better to have merely a little learning than none. To know why a thing is done in one way rather than another helps considerably in putting safety matters on a sound foundation. In the operation of plant it is too much to expect the highest attainment of safety if there is ignorance as to the reaction that is in progress and how the course of that reaction may be diverted from the normal by a change in one of the variables—temperature, pressure, and, not least, the speed at which material is entering the plant. Minor points to be observed in operating technique must also be understood, particularly as to the sequence in which they need attention, and in this "to know why" is to ensure a certain degree of safe operation which experience proves to be greater than anticipated.

Confidence, not Over-Confidence

Confidence in the simple procedure of partly closing or opening a valve comes by experience, even though it be merely the valve on the steam-pipe serving a jacketed pan heated by exhaust steam. Unless there is confidence, safe operation is not assured basically. Nevertheless, it is well to guard against being over-confident when more complicated plant is being operated. Because certain indicating and recording instruments have been installed, pray do not consider them as means of adornment to make the plant appear more imposing to the unitiated, or assume that there is little need to observe their indications in the normal course of events. The eye must be trained to be observant, and permitted to

build up that experience which not only explains the cause of changes and fluctuations but can equally well anticipate the movement of the needle or recording pen.

Notice of accidents, with indication of cause and of how the occurrence might have been avoided, should be brought to the attention of all employees as soon as conveniently drafted for publicity on the works notice-board. Due publicity is also desirable for any unsafe practice which has been discovered in the course of works inspection; the actual details may affect the few, but the whole of the personnel will be wiser for a carefully worded notice directed at the few who are directly concerned. To know that fellow-workers are kept alert and conscientious in matters which are their own special care adds to the safety-minded aspect of the works generally. Freedom from accidents at stated intervals should also have publicity, and the good record should be brought to the notice of all new employees.

Gruesome publicity is not to be encouraged, because it is not effective in preventing accidents—irrespective of the source of the poster or the merit of the artist. Rather than point out the possibility of being scalped by having the hair caught up in moving machinery, it is wiser to persuade women employees "to be in the fashion" by covering their hair with a cap; the Factories Act of 1937 provides no legal compulsion in this matter as regards moving machinery considered separately from dangerous trades. Equally true it is that humorous publicity serves only partly—and often poorly—in achieving greater safety. Humorous treatment of serious facts does no more than focus attention temporarily upon a possible danger; there is no lasting impression and certainly no education of the mind in the principle that safety is "a concern of the individual for the welfare of all." Humorous treatment of the effect of an electric shock from a defective switch or the frayed end of a lead may be spectacular enough from the viewpoint of the artist, but such a poster (or thumb-nail illustration in a safety leaflet) is likely to put suggestions of horse-play into the minds of irresponsible persons and junior employees.

Safety measures are adopted and put into words as "safety codes" for the benefit of all who are likely to contact danger, each in his particular sphere of risk. They should be regarded in the light of a heritage which it is the privilege of all employees to enjoy, and not as a tiresome set of rules that must be enforced. As individuals we have our own special contribution to make towards the general safety of operations at the works; "all for one and one for all." The need to observe safe practice applies to labourer and junior as well as to the most skilled of the works personnel and the highest of the administrative officials. When one knows that he fails in his obligations and makes no effort to do better, it is hardly likely that he may expect unfailing adherence to rules on the part of all others.

POLYMERS FOR LEATHER MIXTURES

Leather-fibre materials are used to a certain extent in Germany. They used to consist of fibres of leather produced by tearing up pieces of waste leather (in the same way as rags in the manufacture of shoddy) and mixing with latex. The place of latex is now taken by emulsions of polyvinyl or acrylic acid polymer compounds. It was found that leather tanned with chromates was better than leather treated with vegetable tanning extracts in the matter of strength, wear-resistance, and softness, if the tanning substance was removed with a weak soda solution. Products incorporating polyvinyl acetate were found to offer better tear resistance, but acrylic esters made the leather material softer. Both are inferior to latex in wear resistance owing to their greater water absorption. Fats, softeners, and water-repellents are added to the mass according to individual requirements. The resulting product, which has physical properties resembling those of leather, is obtained in large sheets which must be carefully dried.

INDUSTRIAL ALCOHOL IN AMERICA

A quota of 240,000,000 gallons will be produced by the U.S. alcohol industry, and all necessary quantities for smokeless powder, mustard gas, and medical needs are now being supplied, states Reuter. A spokesman from the industry said that the "quick voluntary conversion" to war-time production of alcohol from grain would result this year in saving 1,200,000 tons of sugar, previously earmarked for alcohol. In addition, "an adequate supply" would be available for synthetic rubber, and, with the amount provided from grain, would be sufficient to manufacture 200,000 tons, or nearly one-fourth of the 870,000-ton synthetic rubber programme.

In Canada, too, the entire output of the alcohol distilleries is to be diverted to war purposes by the Department of Munitions and Supply. From November 1 no producer may use or allocate current production of alcohol for beverage purposes. In this respect the American distilling industry is following the British example in developing vital by-products.

Industrial Safety Gleanings

Suggestions for Reducing Risks

IN *Chemical Safety*, the bulletin of the American National Safety Council, an editorial note quotes from "Accident Rates in the Chemical Industry" for 1941; "Rates decreased particularly in plants manufacturing explosives," and "1941 injury rates were lowest in plants manufacturing industrial gases, fuses and detonators." From the quotations the editor draws the conclusion that where the exposure is definitely recognised and the proper supervision established, and where suitable safe procedure is followed, injury rates can be and are reduced. The value of a clean plant is emphasised with the slogan: "A clean plant is a safe plant." To keep buildings clean and free from rubbish and explosive scrap is nothing but putting safety into practice. "It is taking insurance against accidents when we keep our work places clean and free of cluttering waste."

Another theme of the bulletin, which is taken up in this country by the recently issued report of the Industrial Health Research Board, is that of the necessity of keeping passage ways in the factory open. The report says on this question: "an efficient routing scheme is essential if a high accident rate is to be avoided. Many industrial accidents occur, not at the bench, but in the passage ways of the factory. If goods become congested or have to be brought round awkward corners, unnecessary accidents are sure to occur. It is also necessary to take into consideration the height of the working bench. Since workers differ in height, benches have to be arranged to suit the average height, but workers of short stature should be provided with raised stands or seats, so that they can work comfortably at the bench, with the various articles within easy reach. The provision of such amenities not only lessens the likelihood of accidents, but it also lessens fatigue by avoiding unnecessary stretching for articles."

Accidents and Age

It has been found that young people are more liable than older people to sustain accidents, quite apart from their experience. The report states that the accident rate falls steeply from the age of 14 to 23, after which for practical purposes it may be regarded as stationary. There is a small rise in accident rate in middle age, followed by a fall.

It is not always the lack of precautions of any kind that is the chief danger in a factory. Sometimes steps are taken to lessen risk of accidents which, because they are inadequate and give a false sense of security, are even more to be condemned than no precaution at all. A correspondent to *Chemical Safety*, discussing face shields which are usually made of cellulose acetate, says that these are intended for light operations only and that they do not take the place of goggles, especially in such work as hammering drills, chisels, etc., for which they have apparently been advised. The writer states that, in his opinion, it is inadvisable to recommend light plastic face shields for operations at which they do not provide sufficient protection.

Some Safety Recipes

Safety hints collected in recent bulletins of the Royal Society for the Prevention of Accidents include the use of beryllium bronze, which is already fairly well known for non-spark hand tools, for other purposes where there is a fire or explosion hazard: *e.g.*, for machine parts in chemical, paint, oil, dyestuffs, grain and other works. It is also being used for balls in ball mills. An anti-static belt dressing formula is given. It has, says the bulletin, been tested by the Travellers' Insurance Company, and is recommended by the U.S. Department of Agriculture: fish glue, 9 oz.; glycerine, 7 oz.; sulphonated castor oil, 7 oz.; water, 12 oz.; lampblack, 6 oz.; 2 per cent. ammonia water, 2 oz.

The glue and glycerine are heated together with frequent stirring for two hours at a temperature at which the mixture nearly boils. The other ingredients are stirred into the mixture in the order given. (The ammonia water is made by adding ¼ oz. of household ammonia to 1¾ oz. of water.) The above quantities make a quart of dressing. A weekly application of the dressing to the side of the belt in contact with the pulleys is advised.

An interesting question sent in by a reader is answered by the bulletin. The problem is: "We have to hoist carboys of acid to an upper floor by an overhead travelling crane. Can you provide details of suitable carriers or slinging tackle for this job?" The following reply is given: "Carboys should be provided with a strong wooden case lined with wool-felt, and provided with a hinged front. Metal straps should pass round sides and bottom of the case and have eyes in the top of the irons to take the hooks of a four-legged sling. The case and the irons could with advantage be coated with good acid-resisting paint. Carboys should be examined for cracks, flaws and leaks before being put into the case. Stoppers should be loosened and replaced. The case and straps should be

periodically examined for corrosion. When lifting takes place you might display a large notice on the ground floor: "*Beware—Acid being lifted.*"

Some Useful Hints

Heating Roofing Pitch.—If tar roofing pitch is heated above 200° C. greenish fumes are given off. These are the vapours of the irritating anthracene oils. According to an article in the *Illinois Labour Bulletin* (1041, 2, 16), exposure to these vapours leads to serious burns of the face and arms, and they may even penetrate the clothing. The eyes are easily affected. The remedy is not to heat above 200° C. It is easily possible to exceed this temperature unless care is taken, for temperatures of 220° to 310° C. were observed during experiments.

Release of Pressure from Drums.—When a drum of any corrosive has to be opened there may be sufficient internal pressure to cause some of the contents to spurt out. The following excellent arrangement has been suggested: A diametrical slot is milled across the stopper, starting at the inside face and going about half the length of the thread. As this slot emerges from the bung-hole, any internal pressure is released quietly.

Linseed Oil Fire.—A writer to *Chemical Safety* notes that rags contaminated with linseed oil have ignited from spontaneous combustion after being placed in an oily-rag can for a period of less than four hours. In one case four rags in a five-gallon oily-rag can, which did not offer much confinement, ignited and burned. To prevent this rags contaminated with linseed oil are now being kept submerged in water in five-gallon oily-waste cans.

The great influx of women into industry has created new problems. This fact was emphasised in the report for 1941 recently issued by Sir Wilfred Garrett, Chief Inspector of Factories. On the whole he believes that women are safer workers than most men and the increase of 20 per cent. in fatal accidents over 1940 is due to the increased numbers employed, and to their increased share in dangerous processes. Discussing dangers from gas in factories, Sir Wilfred states that an increase is evident in all the main classes of gas which give rise to accidents, the greatest danger patently being from carbon monoxide.

Benzene in Air

Dangerous Concentrations Signalled

WHEN air breathed contains more than 1.7 mg. of benzene per litre, rapid poisoning takes place. According to the standards of the Russian Ministry of Health only 0.1 mg. per litre is allowed in factory air. I. Kogan (*J. Appl. Chem. Russ.*, 1941, *14*, 626) has devised an apparatus which permanently analyses the air and produces a visual or sound signal when the benzene concentration reaches a dangerous level.

A pump exhausts 75 c.c. of air per minute. This air passes through a flask with 25 per cent. caustic potash and then through a porcelain tube maintained at 650-750° C., in which benzene is burnt to CO_2. The air, now containing CO_2, bubbles through a conductivity cell and is then exhausted into the atmosphere. Simultaneously a slow current of a calcium hydroxide solution is passed through the conductivity cell; the speed of the flow is constant, being caused by a constant head, and the liquid overflows over the wall of the cell. When the $Ca(OH)_2$ solution comes in contact with the air containing CO_2, a precipitate of $CaCO_3$ is formed, and the electric conductivity is lowered. An alternating electric current passes permanently through the conductivity cell. When the amount of CO_2 in the air reaches a predetermined level, and the electric conductivity of the solution sinks below a predetermined limit, this current switches on an electric relay operating a lamp or a bell. A sketch of the apparatus and its wiring scheme is incorporated in the original paper.

Since air-benzene mixtures may be explosive, the combustion tube is fixed outside the building, and only the signal is arranged inside. The apparatus registers, of course, other organic vapours as well, particularly toluene, xylene, etc. When used in a gas works it gave a satisfactory performance.

PLASTICS FOR ROLLING-MILL BEARINGS

In a description of a new 17-ft. four-cylinder rolling mill for thick plates weighing up to 165 tons, which has been built in Germany and is claimed to be the biggest in the world, it is stated that hard, resin-impregnated cotton and cell-wool tissues have been used on a substantial scale and with satisfactory results, chiefly as bearings. In particular it is stated that the supporting and operating cylinders with diameters of 3½ and 2½ ft. and the plate-turning apparatus were equipped with plastic bearings. The bearings, which must withstand a rolling pressure calculated at 3000 tons per bearing, are lubricated with a suitable grease for use under high pressures and are water-cooled. The lubricant is distributed through ordinary steel pipes and movable hoses made of buna rubber.

New Zinc Process

Methane Treatment of Concentrates

PAVING the way for development of large, untouched reserves of domestic zinc ores for use in the war machine, the U.S. Bureau of Mines is to establish a $350,000 pilot plant and laboratory to conduct commercial-scale tests of a gas reduction process developed by the Bureau for production of the zinc. Based on experiments dating back more than ten years, the Bureau's process has successfully passed tests conducted on a laboratory-size furnace and has been found superior in several instances to commonly-used commercial methods which require large amounts of electrical energy or coke and coal. The pilot plant, which probably will be built somewhere in the South-Central United States, will have a daily output of 500 lb. of metallic zinc. Funds for construction of the research plant have been provided in the First Supplmental National Defense Appropriation Act, 1943.

Gas Supply near the Mines

Representing a distinct departure in metallurgical processes for treatment of zinc-bearing ores, the Bureau's method uses a natural gas—methane—in several stages of a reducing cycle from which ore concentrate emerges as high-purity zinc. Natural gas frequently occurs near areas which are rich in zinc-bearing ores, but which are removed from adequate supplies of electrical energy, coal or coke. "The Bureau believes that the untapped reserves of zinc ores and the abundance of natural gas can be paired successfully into an industrial team which will speed the output of zinc essential to the manufacture of galvanised iron, zinc alloy die castings, brass cartridge cases for guns, batteries, and a multitude of other items," said Dr. Sayers, Director of the Bureau of Mines.

Experiments by Bureau metallurgists indicate that only 5 cu. ft. of natural gas are necessary to produce 1 lb. of zinc and that as much as 95 per cent. of the zinc can be extracted from the ore by the new process. The amount of fuel required to produce 1 lb. of zinc by the natural gas reduction method is estimated at about half that needed in commercial furnaces using coal and coke. Bureau engineers also believe that the construction cost of commercial-size furnaces using the natural gas reduction process would be much smaller than the outlay for electrolytic zinc plants and would compare favourably with the cost of building other types of metallic zinc plants.

Four principal phases compose the Bureau's process. At the outset, zinc concentrate is roasted in a pre-treatment furnace to remove undesirable sulphur. The ore is then placed in a retort; methane is added and the retort is heated with methane burners. Zinc vapour then forms and is condensed into zinc metal. While the laboratory-size furnace used by the Bureau in developing the process generally proved successful, Dr. Sayers explained that many test runs must be conducted with a commercial-size furnace or pilot plant, and that certain alterations and adjustments must be expected before a method suitable for industrial use can be developed. Chemists, metallurgists, and engineers assigned to the laboratory will work full time in solving the problems that may arise.

As a further aid to the mining industry the Bureau has developed sensitive instruments which will help in the recovery of thousands of tons of ore left standing in mine pillars to support the roof during earlier mining operations. These instruments amplify and record sub-audible noises which indicate pressure zones in rock and warn of impending falls of ground in mines. The equipment was tested in some of the zinc-lead mines of the Middle West, and it was found that many pillars can be recovered without jeopardising the lives of miners or damaging surface buildings and terrain.

Carbon Workers' Claim

Wages and Conditions Discussed

A DISPUTE over the wages and conditions of the employees of a carbon manufacturing firm was the subject of a public hearing before the National Arbitration Tribunal in London last week. The Chemical Workers' Union claimed from the Ship Carbon Company of Great Britain a new scale of wage-rates which would give to most grades of workers an increase.

Mr. J. Gillian, for the union, said that they were asking for the basic rates of 81s. per week for labourers. There was a question of carbon dust getting into the lungs and setting up a physical disability which was something akin to silicosis.

Mr. G. O. Slade, for the firm, said that the standard under the bonus system was an extremely easy one for the workers to reach. Comparing the rates at present being paid with those claimed by the union, he said that an adult male labourer now received £6 5s. 8d. Under the union scheme he would get £5 3s. 9d. Adult females instead of getting £3 5s. 9d. would get £2 9s. 3d. The hearing concluded and the tribunal will issue its award later.

Personal Notes

MR. ALEXANDER BARCLAY and MR. PHILIP CAMBERG, both students of the Heriot-Watt College, Edinburgh, have been awarded the National Certificate (Higher) in chemistry.

DR. WILLIAM BRADLEY has taken up a new appointment on the scientific staff of The British Drug Houses, Ltd. Dr. Bradley, who has resigned his position on the staff of the Manchester College of Technology, studied originally under Sir Robert Robinson at Manchester University. The research work he has carried out in organic chemistry includes the disclosure of the mechanism of the so-called Nierenstein reaction, the development of the theory of aromatic substitution by anionoid reagents, and the advancement of the chemistry of the anthocyanidins and benzanthrone.

SIR HENRY DALE, who, as mentioned in our last issue, has just accepted the directorship of the laboratories of the Royal

Sir Henry Dale.

Institution, together with the Fullerian Professorship (in succession to the late Sir William Bragg), is one of the most untiring exponents of the utilisation of science to the fullest extent in the war effort. Although he had just retired from the directorship of the National Institute for Medical Research, he did not hesitate in taking on this new responsibility, though with the express stipulation that his term of office should be limited to three years. Besides occupying the presidential chair of the Royal Society, he is serving the cause of science also as chairman of the Science Committee of the British Council, and—in a more directly belligerent manner—as a member of the Scientific Advisory Committee of the War Cabinet.

PROFESSOR SAMUEL SUGDEN, F.R.S., D.Sc. (Lond.), A.R.C.S., A.I.C., has been selected to succeed Dr. Godfrey Rotter as Director of Explosives Research at the Royal Arsenal, Woolwich. Dr. Sugden has been Professor of Chemistry at University College, London, since 1937, and prior to that he spent 18 years teaching at Birkbeck College, first as Lecturer in Chemistry (1919-28), then as Reader in Physical Chemistry (1928-32), and finally as Professor of Physical Chemistry (1932-37). He is no stranger to the Royal Arsenal, having served there as research chemist in 1916-19, after two years with the B.E.F. in France. He has made many contributions to chemical literature, and in this field is best known from his *Class Book of Physical Chemistry*, the familiar "Sugden and Lowry," which he compiled with the late Professor Lowry.

Obituary

MR. KEITH BENHAM, managing director of the Universal Grinding Wheel Co., Ltd., died at Stafford on October 12.

MR. A. L. MILLER, of John Miller & Co., Ltd., chemical manufacturers, Sandilands, Aberdeen, who has died in Aberdeen, aged 76, was the son of the founder of the chemical works and had been associated with the firm for nearly 40 years, first as a partner and latterly as chairman.

New Control Orders

Fluorspar

The Control of Fluorspar (No. 1) Order, 1942 (S. R. & O. 1942, No. 2077) which comes into operation on October 19, makes the disposal and acquisition of fluorspar containing more than 60 per cent. of calcium fluoride subject to licence. The object of the Order is to ensure the most efficient distribution of available supplies to meet the rising demand, including the restriction of consumption of the higher qualities to purposes for which they are essential. Inquiries should be addressed to the Chrome Ore, Magnesite and Wolfram Control, Broadway Court, Broadway, London, S.W.1.

Licensing of Factories

Under the Location of Industry (Restriction) Order, 1941, industrialists were under the obligation in the case of premises of 3000 sq. ft. or over, to obtain a licence before changing the use to which a factory or warehouse is put, or using any premises of that size for purposes of production or storage. By a new Order (Location of Industry (Restriction) Order, S. R. & O. 1942, No. 2072) which came into force on October 12, a licence must now be obtained whatever the size of the premises.

Goods may be temporarily stored for 28 days without a licence under the existing General Licence, which remains in force, and licences issued under the earlier Order remain valid.

General News

From Week to Week

A new limestone-grinding plant at Moneymore, County Antrim, is claimed to be the most up-to-date of its kind, as well as economical in fuel requirements.

To meet the shortage of wool oil Irish research workers have evolved an emulsion with carrageen moss as a base; this is being used successfully by textile producers in Eire.

A national campaign for the recovery of non-ferrous scrap which, according to the Ministry of Supply, is needed by the country, is to be started on October 19.

A special examination of the molybdenum deposits in County Galway has just been completed for the Eire Government and a report is being prepared. Veins which had previously been opened were further examined and samples taken.

The following have been elected Fellows of the Institute of Physics: J. D. Bernal, M.A.; K. G. Emeleus, M.A., Ph.D.; G. Liebmann, D.Phil.; and W. E. M. Romer, Dr.Tech.Sci. Twenty-four Associates were also elected, and 24 Subscribers and four Students were admitted.

"Active Service for Industry" is the title of a new booklet giving an account of the activities of the Federation of British Industries and outlining its working structure and constitution. It is a useful work of reference, especially in these times when the question of post-war industrial organisation is so much in people's minds.

The Board of Trade has made a new order which came into force on October 10, containing 344 additions to the "Black List" of traders in neutral countries with whom it is unlawful to have dealings of any kind. This is the Trading with the Enemy (Specified Persons) (Amendment) (No. 16) Order, 1942.

Industrial lacquer has been supplied by paint manufacturers to cosmetic manufacturers in nail-varnish bottles and passed off to the retailer as genuine nail varnish. This was one of the numerous "black market" activities described by Mr. G. W. Yandell, chief enforcement officer of the Board of Trade, at the annual meeting of the Magistrates' Association, held last week in London.

The United Molasses Co., Ltd., has taken a controlling interest in a company—the Q Vehicle Co., Ltd.—recently registered. The company is to engage in the manufacture of battery-operated electric vehicles, a type of vehicle has so far been used only to a limited extent. While the output of the new company will inevitably be restricted by wartime shortages, post-war development possibilities are considerable.

In the last 12 months contributions to the Red Cross Penny-a-Week Fund have increased from an average of £20,000 a week to an average of £50,000 a week. Present average expenditure of the Red Cross and St. John, however, is well over £100,000 a week.

The British Standards Institution has issued a range of 11 camouflage colours, which have been approved by the Ministry of Supply. The specimens contained therein are 2 in. by 3 in. and have shade numbers by which they will be known. Copies of this publication (B.S. 987C) may be obtained from the Institution, 28 Victoria Street, London, S.W.1, price 1s. 6d. (1s. 9d. post free).

An agreement to benefit more than 200 women workers has been made between the Scottish Brass Turners', Fitters', Finishers' and Instrument Makers' Association and Messrs. Robert Shanks and Company, Barrhead. All women will be trained by skilled men and after completing their instruction they will receive a minimum rate equal to 75 per cent. of the standard rate for tradesmen.

The Committee on Building Materials Standardisation has produced a number of Economy Memoranda (E.M. Nos. 1-5), prohibiting and restricting the use of certain materials, among which are listed lead, bitumen and tar, rubber, cast iron, and putty. Alternative materials are suggested which can ably serve the desired war-time purpose. Maintenance and repairs are affected as well as new work.

An extensive acreage of clay deposits between Cloyne and Midleton, County Cork, is being exploited for silica and colloidal clay. The silica will be used in the manufacture of cleansers, as a ceramic flux, as a refractory, and in paint and rubber manufacture, and the colloidal clay is employed in road-making and is converted by chemical process into binding materials. Most of the annual production of 6000 tons of silica and 4000 tons of colloidal clay is to be exported.

Foreign News

Production of linseed oil in the United States during the second quarter of 1942 was 241,015,000 lb., according to preliminary report.

The U.S. Mint has issued a special five-cent. piece for wartime, made up of 56 per cent. copper, 35 per cent. silver and 9 per cent. commercial manganese, says Reuter.

The world's richest bauxite deposits have been discovered in the mountain region of Borzoeny, Hungary, according to Radio Vichy.

Annual consumption of phenol in Mexico amounts to about 10,000 kg. The United States, and formerly Germany and the Netherlands, have been the chief suppliers.

A reduction in customs duties on imports into the U.S.A. of coconut oil not originating in the Philippines has been approved. This measure should benefit the Brazilian coconut trade to a considerable extent.

The present "stock pile" of scrap iron in America will suffice for 100 per cent. production in the U.S. steel industry throughout the coming winter, Mr. Patterson, U.S. Under-Secretary of War, assured reporters in Washington last week.

Almost five times as much essential oil of orange was exported from Jamaica in January-May, 1942 (73,538 tons) as in the same months of 1941 (14,955 tons). An even greater increase is recorded in the value, which rose from £7311 to £96,833.

A Belgian asphalt factory near Assche, nine miles north-west of Brussels, has been completely burned down, says the Belgian News Agency. Damage is estimated at millions of francs. The German explanation of the fire was "inadvertence."

Russia is increasing its utilisation of gas producers to a considerable extent. One large tractor station has switched nearly all its tractors over to this fuel, using wood blocks as the gas source. Mobile producers are also being built for use with threshing machines.

An extensive search for tungsten and tin is being made in Northern Australia by the Controller of Metals (Mr. Malcolm Newman), the Commonwealth Geological Adviser (Dr. Raggett), and the personnel of the Northern Territory Mines Branch. The survey is concentrating first on developing tungsten resources.

Brazil's principal chemical imports in recent years are reported by the U.S. Department of Commerce to be as follows: mineral salts, caustic soda, and other inorganic chemicals, 93,933 tons in 1940, and 85,306 in 1941; pharmaceutical and other synthetic organic chemicals, 45,627 tons in 1940, and 42,420 in 1941; aniline dyes and essences, 4773 tons in 1940, and 6682 in 1941.

The chemical nature, properties and uses of luminescent pigments are described and the application of phosphorescent pigments to fabrics is discussed by F. W. Joerger in *Amer. Dyestuffs Rep.* (1942, *31*, 183, 190). The pigments are mixed with a lacquer, such as an ethyl cellulose, and the mixture is applied to the fabric by spraying, screen printing, or preferably by means of the pyroxalin-coating machine. After drying, one or two finishing coats of clear lacquer are applied. Various uses for such coated fabrics are mentioned.

The chemical plant of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Warfield, B.C., is being further enlarged, it is reported.

Colonel C. F. Stallard, Union Minister of Mines, has announced promising discoveries of tin in South West Africa, where, since 1912, tin, alluvial and in pegmatite lodes, has been worked on a small scale round the granite massif of the Erongo Mountains.

The only important explosives concern in Upper Silesia, Sprengstoffwerke Oberschlesien, G.m.b.H., has suddenly raised its capital from 500,000 RM. to 6 million R.M. This would appear to betoken a shift of the important I.G. subsidiary explosives works from the Rhineland to a less vulnerable area.

Manufacturers of aluminium salts and alumina for the chemical and other industries in the United States reported the consumption, in 1941, of approximately 237,000 long tons of dried bauxite, 11,022 short tons of alumina, 12,663 tons of commercial aluminium trihydrate, 4170 tons of primary and secondary aluminium, and a quantity of clay, alunite, beryl, and chromite residue.

A plant for making motor spirit from rubber is being built near Kuala Lumpur (Malaya), according to the Domei agency. It is claimed that diesel and fuel oil as well as anti-malaria preparations can also be obtained from rubber. The first plant will have a capacity of 30,000 gallons of motor spirit per annum. Efforts in the same direction have been reported from Thailand.

A plant for the treatment of mulberry bark is to be erected by the Bulgarian Government, following the development of a German process for the production of fibres from the bark of the mulberry tree, hitherto known to the textile industry only as a source of food for the silkworm. The bark fibres are said to be extra strong, and an output of 2000 tons per annum of "mulberry cell wool" is aimed at.

To replace imports of phosphates from Ocean Island and Nauru, the South Australian deposits of phosphate rock have been re-examined; in the last 10 years only 250 tons have been produced from these extensive but low-grade deposits. A new discovery of phosphate rock is reported from New Zealand, where a deposit of some hundred million tons has been located at Clarendon, 30 miles S.W. of Dunedin.

A number of industrial raw materials have become less scarce in relation to requirements in the United States, according to the report of the War Production Bureau covering the period June 1-September 15. Among items that have been transferred from Class 2 (restricted civilian use) to Class 3 (unrestricted) are: lead, ferro-manganese, palladium, and the lower grades of bauxite. High-grade bauxite, however, still remains in Class 1 (for strictly military requirements).

Forthcoming Events

The Association of Scientific Workers announces a conference on "Science for Victory," at the Royal Hotel, Cardiff, on **October 18,** (10 a.m.—1 p.m. and 2.15—5.15 p.m.), to demonstrate to the people of South Wales the necessity of scientific control and planning in all aspects of industry and life for the speedier winning of the war. Tickets, price 1s., from the Conference Secretary, 130 Cardiff Road, Llandaff, Glam.

The **Institute of Chemistry** (London and S.E. Counties Section) will meet at 30 Russell Square, on **October 21,** at 4 p.m., when Mr. G. Smith, M.Sc., A.I.C., will present a paper on "Moulds and their Industrial Application."

There will be a meeting of the London and South-Eastern Section of the **Institute of Chemistry,** at the Institute of Chemistry, Russell Square, on **October 21,** at 4 p.m., when Mr. G. Smith, M.Sc., A.I.C., will speak on "Moulds and their Industrial Application."

The annual general meeting of the **British Standards Institution** will be held at the Institution of Mechanical Engineers, St. James's Park, London, on **October 22,** at 12.15 p.m.

The inaugural meeting of the Tees-Side Section of the **Institute of Chemistry** has been arranged for **October 22,** when Dr. J. J. Fox, president of the Institute of Chemistry, will speak on "Policy and Future of the Professional Chemist."

A short symposium on "The Chemist and Industrial Health" will be held by the South Yorkshire Section of the **Institute of Chemistry** on **October 22,** at 2.45 p.m., in the City Memorial Hall, Sheffield. The Lord Mayor of Sheffield will open the meeting; Dr. G. Roche Lynch, O.B.E., will be in the chair; and the opening speakers are Dr. F. S. Fowweather and Dr. M. W. Goldblatt. Admission by ticket on application to the Hon. Secretary, G. Parkin, 52 Whirlow Grove, Sheffield, 11.

A meeting of the Newcastle-upon-Tyne Section of the **Society of Chemical Industry** will be held in the Chemistry Lecture Theatre, King's College, at 5.30 p.m., on **October 22.** A lecture on "An Agricultural Chemist's Part in the Food Production Campaign" will be given by Mr. Brynmor Thomas, of the college's agricultural department.

The Nottingham Section of the **Society of Chemical Industry** will hold a meeting at the Welbeck Hotel, on **October 22,** at 7 p.m. Dr. G. Gee, M.Sc., will speak on "The Rubber Molecule: Its Size and Significance."

A meeting of the Birmingham Section of the **Society of Chemical Industry** will be held in the Chamber of Commerce, Birmingham, on **October 23,** at 5.30 p.m., when Dr. M. Stacey will speak on "Mucopolysaccharides."

At a meeting of the Liverpool Section of the **Society of Chemical Industry,** to be held at 6 p.m., on **October 23,** at the Adelphi Hotel, the subject of an address by Mr. A. E. Findley, B.Sc., F.I.C., will be "Some Reflections on the Training of Chemists in Industry."

There will be a meeting of the London Section of the **Electrodepositors' Technical Society,** at 4.30 p.m., on **October 26,** at the Northampton Polytechnic, Clerkenwell, E.C.1. Mr. E. H. Laister will present a paper on "War-Time Applications of Precious Metal Plating."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Company Winding-up Voluntarily

SEROPHARM, LTD. (C.W.U.V., 17/10/42.) By special resolution, September 25. Frances Fyles, 4 South Place, E.C.2, and R. N. Eichholz, 46-7 London Wall, E.C.2, appointed liquidators.

Notice of Intended Dividend

BEYER, ROBERT, formerly 140 Piccadilly, London, W.1, research chemist and inventor. Last day for receiving proofs, October 21. Trustee: T. J. M. Macleod, 4 Bucklersbury, E.C.4.

Company News

Aspro, Ltd., announce a net profit of £261,774 for the year ended June 30, and have declared a final dividend on the ordinary stock of 15 per cent., less tax (same).

Oxley Engineering Co., Ltd., announce a trading profit for the year to June 30, of £76,102 (71,822); net profit, £14,034 (£13,953), to general and taxation reserve, etc., £8000 (£6000); forward, £6809 (£7025).

The chairman of the **Triplex Safety Glass Co., Ltd.,** reports that the company has made a good profit during the current year, though not so substantial an amount as last year. For security reasons, all the factors causing this may not be disclosed. Of the company's subsidiaries, the **Thermolux Glass Co., Ltd.,** was compelled to cease trading during the year, as certain essential raw materials became impossible to obtain. **Quickfit and Quartz, Ltd.,** however, showed larger profits

and continued its favourable progress: the shortage of skilled workers was a serious handicap.

British Celanese Scheme

The second preference shareholders of **British Celanese, Ltd.,** are to receive 4 per cent. funding certificates in full settlement of arrears, which amount to 15s. 9d. gross or 7s. 10½d. net per share, covering ten and a half years to April 30, 1942. Holders of each £1 share will receive the equivalent of 8s. nominal amount of certificates. The directors state that now that the profit standard for E.P.T. purposes has been fixed, the discussions on the question which were recorded in our columns last October having been concluded, they are in a position to submit a scheme for dealing with the preference arrears. The scheme is based on the position at which the company has now arrived, including an estimate of profits to June, 1942, and the current trading position.

Interest on the new certificates is dependent on profits, is cumulative, and will be redeemed out of profits by means of a fund to be established for this purpose, with an ultimate right, on liquidation, to the repayment of the nominal amount, with a premium of 5 per cent. plus any arrears of interest, out of surplus assets remaining after payment of all liabilities and repayment of the first preference capital. A provisional profit statement shows that the profit for the year to June 27, 1942, after charging general expenses, etc., reached a new high level, the estimated figure of £1,860,000 compared with £1,087,521 actual last year.

Chemical and Allied Stocks and Shares

MARKETS have been less active, and in some directions recent gains in values attracted a fair amount of profit-taking. Nevertheless, the reaction was very moderate compared with the extent of the rise shown in recent weeks, and the general undertone remained firm, sentiment having been assisted by the Prime Minister's speech. Moreover, in some instances, further gains were shown on balance.

At the time of writing, Imperial Chemical have moved up further to 35s. 1½d. which compares with 34s. 9d. a week ago, yield considerations having attracted buying. On the basis of last year's 8 per cent. dividend, I.C.I. ordinary still offer a yield which is somewhat higher than the return on various other leading industrial shares. Lever & Unilever remained at 30s. 6d. and, following the chairman's annual statement, Triplex Glass 10s. ordinary units were 29s. 6d. Elsewhere, British Aluminium have remained at 47s. 9d., while at 72s. 6d. British Oxygen were 6d. higher on balance. On the other hand, Borax Consolidated deferred eased from 34s. 6d. to 34s., and Barry & Staines went back from 37s. 6d. to 36s. 6d. United Molasses were slightly lower at 30s. 6d. although the interim dividend on the last-named is generally expected to be maintained. Distillers ordinary units at 80s. 6d. have lost a small part of their recent advance. W. J. Bush were quoted at 48s. B. Laporte were around 70s. and very firmly held, while Fison Packard were 38s. 6d.

There was again a good deal of activity in British Celanese issues, but prices reacted following their recent advance, and the second preference were 26s., the terms of the scheme to fund dividend arrears not being in accordance with general market expectations. Bradford Dyers ordinary were 14s. and the preference 17s. 3d., hopes having persisted that the balance of the arrears of preference dividend may be paid shortly. Richard Thomas were active among iron and steel issues, and these 6s. 8d. shares have now improved to 8s. Tube Investments were higher at 88s. 9d., Stewarts & Lloyds 50s., and United Steel 24s. 10½d. United Glass Bottle ordinary were dealt in up to 56s. 3d. There was again a fair amount of business passing in shares of companies associated with plastics, but prices were inclined to ease in some cases: Erinoid 5s. ordinary were 9s. 10½d. and British Industrial Plastics 4s. 7½d.

Among other securities, Goodlass Wall were inclined to improve, dealing up to 12s. 6d. being recorded in these 10s. shares. Burt Boulton changed hands up to 16s. and British Glues 4s. ordinary up to 6s. 7½d. Monsanto Chemicals 5½ per cent. preference were again 22s. 6d., Morgan Crucible 5½ per cent. preference 25s. 7½d., and the 5 per cent. preference of the last-named company 23s. 1½d. Greeff-Chemicals 5s. units were 5s. 7½d. General Refractories and Imperial Smelting were again both quoted at 12s. 7½d. There was a good deal of activity in British Plaster Board 5s. ordinary, which were 26s. 3d. and Associated Cement were 53s. 9d. In advance of publication of the financial results, Wall Paper Manufacturers deferred units were 28s. 9d. or within 3d. of the level ruling a week ago. Pinchin Johnson were 27s. 3d. "ex" the interim dividend, and elsewhere, Blythe Colour 4s. ordinary changed hands at 5s. 10½d. at one time.

Boots Drug 5s. ordinary were firm at 38s. 3d., Timothy Whites 22s. 10½d., and Sangers 18s. 6d. In other directions, Turner & Newall improved further to 74s. there being talk in the market of the possibility of a small increase in the dividend,

although it is realised that the directors invariably deal conservatively with profits. Murex shares eased to 96s. 10½d., but Metal Box ordinary were better at 82s. 3d. Oil shares were active and, at the time of writing, have improved further in price under the lead of Anglo-Iranian and Burmah Oil, sentiment in regard to which was assisted by hopeful views of the latest turn in war developments.

British Chemical Prices

Market Reports

REPORTS from most sections of the market indicate that contract deliveries are being maintained on a fairly good scale and, so far as new business is concerned, inquiries have been moderate. There is little alteration to report in the supply position and in most cases dealers already have sufficient orders on their books to absorb supplies as they become available. Among the soda products, offers of chlorate of soda are none too plentiful and no change is reported in the position of yellow prussiate of soda and bichromate of soda. Hyposulphite of soda is firm and in good request. A routine trade continues to operate among the potash compounds, supplies of which are scarce. Elsewhere a steady demand is reported for glycerine and hydrogen peroxide, and white powdered arsenic is a good market. There is little change to report in the market for coal-tar products and values continue strong. Buying in most sections has been comparatively steady with xylols and naphthas in moderate request.

MANCHESTER.—Fresh inquiry on the Manchester chemical market during the past week has been of fair extent and a moderate aggregate volume of orders for a wide range of materials has been reported, with bleaching, dyeing, and finishing chemicals prominent. In the meantime, existing commitments are, on the whole, being steadily drawn against, especially in the alkalis. So far as prices are concerned, market conditions generally are on a firm basis. Among the by-products, a moderate trade is passing in pitch and pyridine, but in most other sections, both in the light and heavy materials, supplies are being taken up in good quantities.

GLASGOW—There is no actual change in the position in the Scottish heavy chemical trade during the past week. Home business remains steady; export inquiries are rather limited. Prices remain very firm.

Price Changes

Formaldehyde.—£24 10s. to £26 per ton in casks, according to quantity, d/d.

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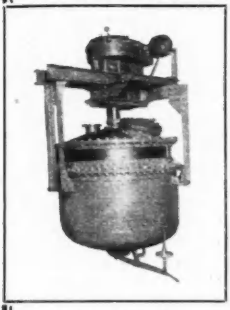

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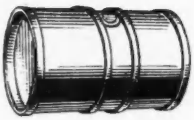

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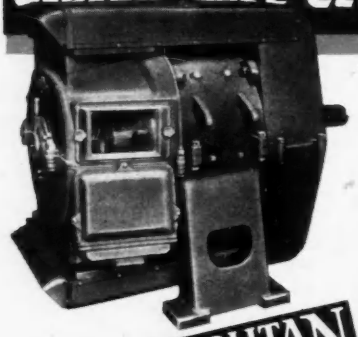

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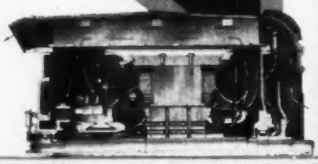

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